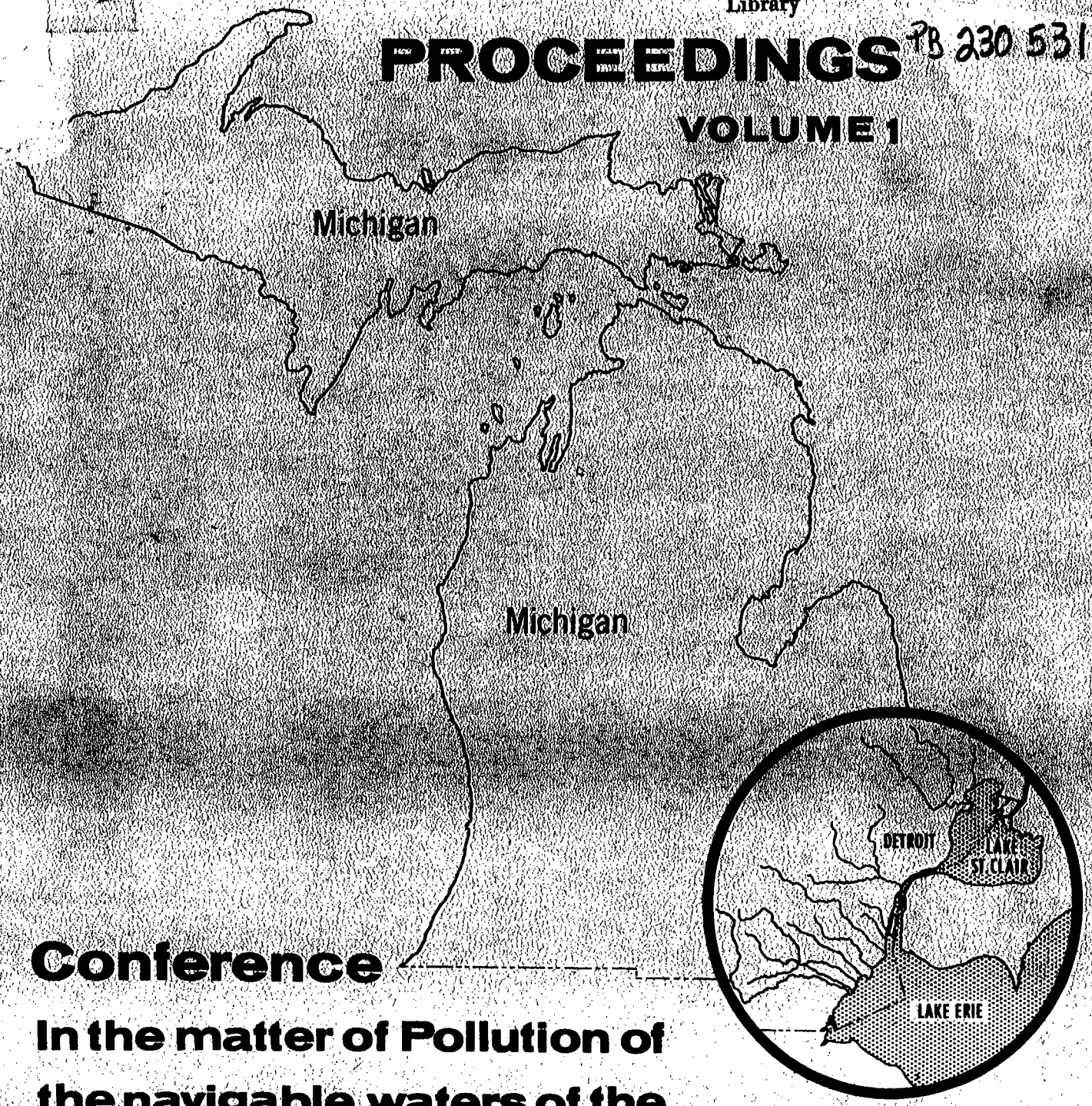
PROCEEDINGS

VOLUME 1

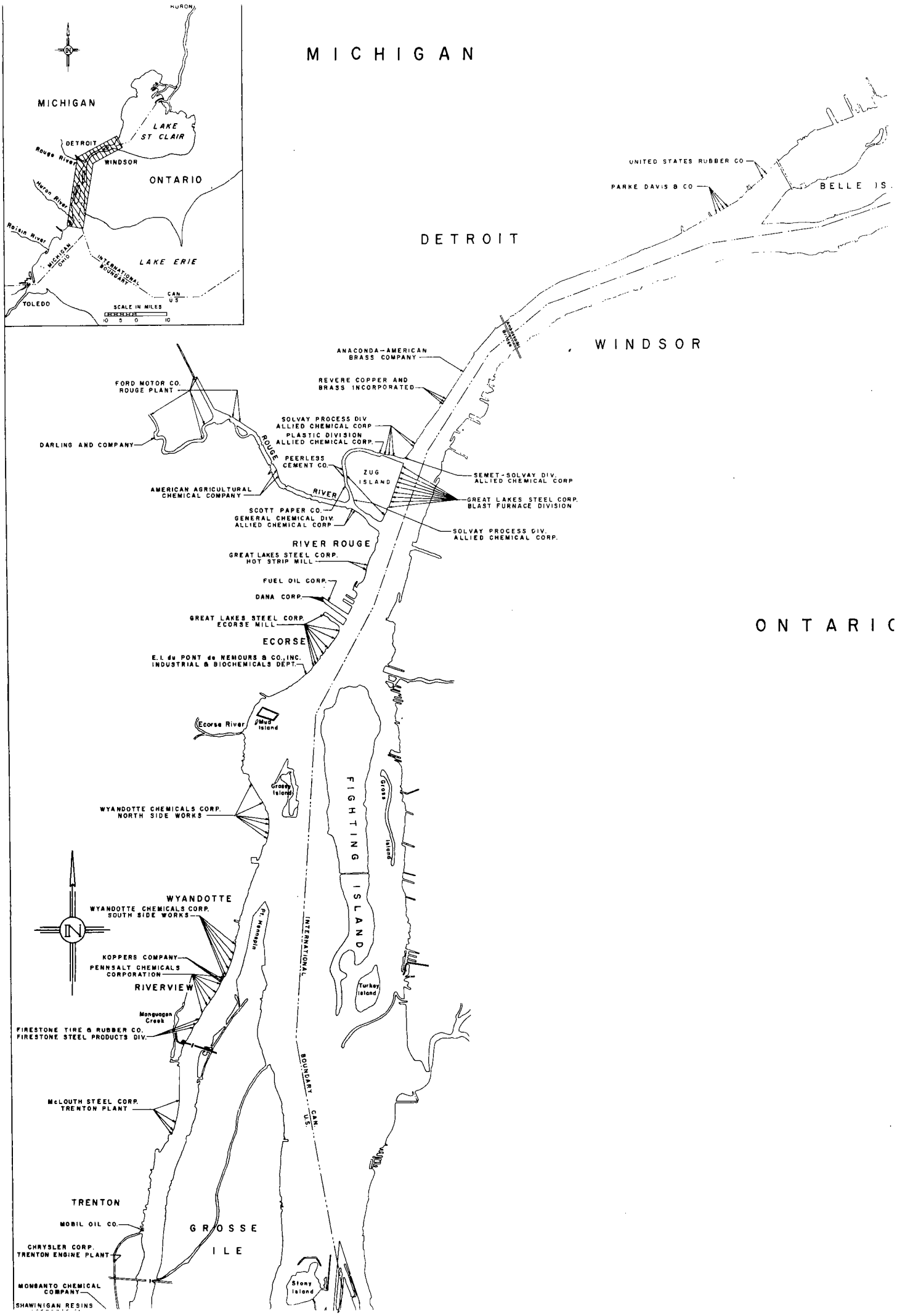


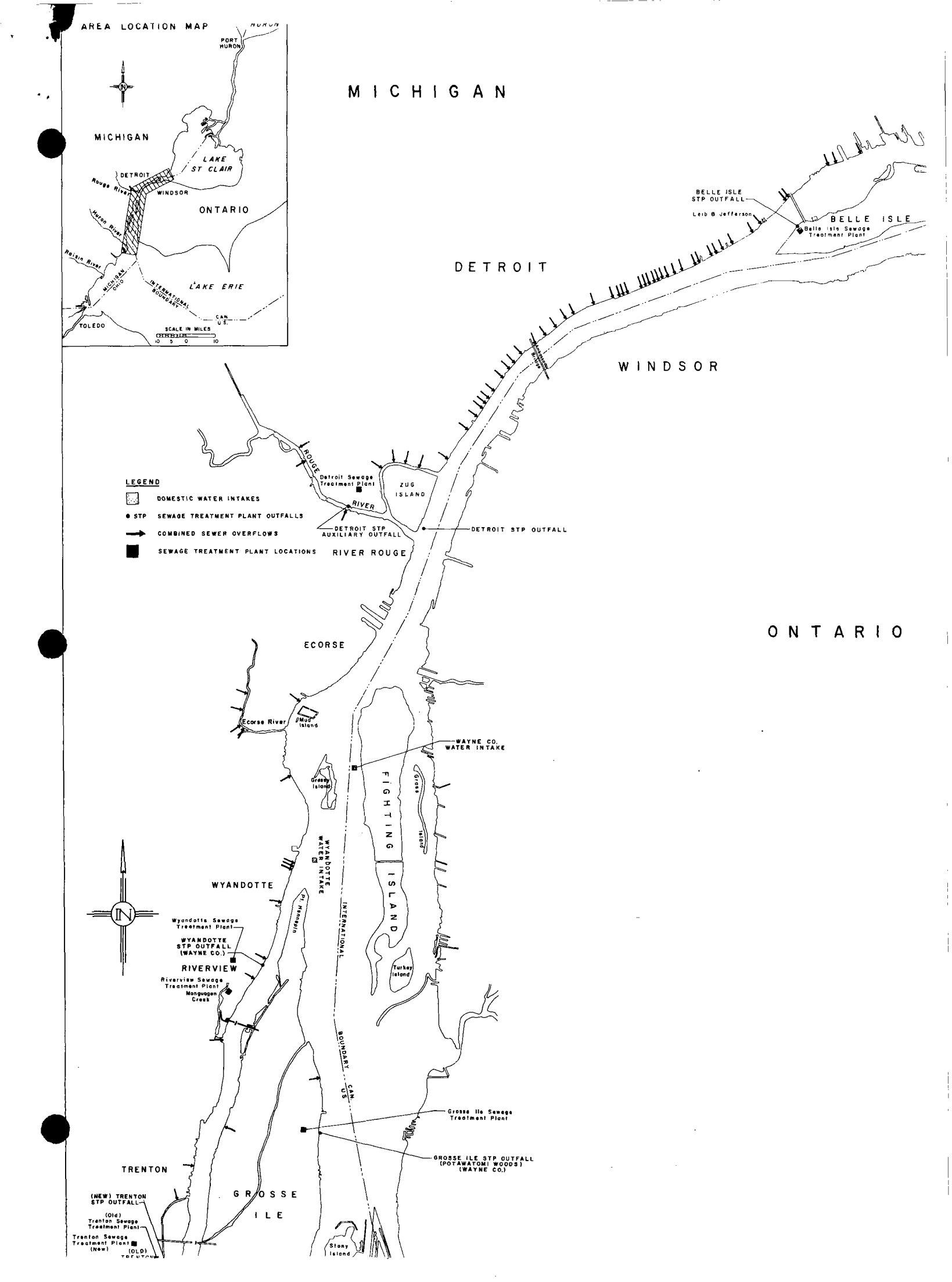
Conference

In the matter of Pollution of the navigable waters of the Detroit River and Lake Erie and their Tributaries in the State of Michigan

SECOND SESSION
JUNE 15-18, 1965

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE


MICHIGAN
DETROIT
WINDSOR
ONTARIO
HURON
MICHIGAN
LAKE ST CLAIR
DETROIT
Rouge River
WINDSOR
ONTARIO
Huron River
Raisin River
MICHIGAN
OHIO
INTERNATIONAL BOUNDARY
LAKE ERIE
CAN
U S
TOLEDO
SCALE IN MILES
10 5 0 10
UNITED STATES RUBBER CO
PARKE DAVIS & CO
BELLE IS
ANACONDA-AMERICAN BRASS COMPANY
REVERE COPPER AND BRASS INCORPORATED
FORD MOTOR CO. ROUGE PLANT
SOLVAY PROCESS DIV. ALLIED CHEMICAL CORP
PLASTIC DIVISION ALLIED CHEMICAL CORP.
DARLING AND COMPANY
ROUGE RIVER
PEERLESS CEMENT CO.
ZUG ISLAND
SEMET-SOLVAY DIV. ALLIED CHEMICAL CORP
AMERICAN AGRICULTURAL CHEMICAL COMPANY
GREAT LAKES STEEL CORP. BLAST FURNACE DIVISION
SCOTT PAPER CO.
GENERAL CHEMICAL DIV. ALLIED CHEMICAL CORP
SOLVAY PROCESS DIV. ALLIED CHEMICAL CORP.
RIVER ROUGE
GREAT LAKES STEEL CORP. HOT STRIP MILL
FUEL OIL CORP.
DANA CORP.
GREAT LAKES STEEL CORP. ECORSE MILL
ECORSE
E.I. du PONT de NEMOURS & CO., INC. INDUSTRIAL & BIOCHEMICALS DEPT.
Ecorse River
Mud Island
Grassy Island
FIGHTING ISLAND
Grassy Island
WYANDOTTE CHEMICALS CORP. NORTH SIDE WORKS
WYANDOTTE
WYANDOTTE CHEMICALS CORP. SOUTH SIDE WORKS
Pt. Mamajuda
INTERNATIONAL BOUNDARY
CAN U.S.
KOPPERS COMPANY
PENNSALT CHEMICALS CORPORATION
RIVERVIEW
Turkey Island
Monguagon Creek
FIRESTONE TIRE & RUBBER CO. FIRESTONE STEEL PRODUCTS DIV.
McLOUTH STEEL CORP. TRENTON PLANT
TRENTON
MOBIL OIL CO.
GROSSE ILE
CHRYSLER CORP. TRENTON ENGINE PLANT
MONSANTO CHEMICAL COMPANY
SHAWINIGAN RESINS
Stony Island
ONTARIO


AREA LOCATION MAP
PORT HURON
MICHIGAN
LAKE ST CLAIR
DETROIT
WINDSOR
Rouge River
Huron River
Raisin River
ONTARIO
LAKE ERIE
MICHIGAN OHIO
INTERNATIONAL BOUNDARY
CAN U.S.
TOLEDO
SCALE IN MILES
10 5 0 10
MICHIGAN
DETROIT
WINDSOR
ONTARIO
BELLE ISLE STP OUTFALL
Leib & Jefferson
BELLE ISLE
Belle Isle Sewage Treatment Plant
ROUGE RIVER
Detroit Sewage Treatment Plant
ZUG ISLAND
DETROIT STP AUXILIARY OUTFALL
DETROIT STP OUTFALL
RIVER ROUGE
LEGEND
DOMESTIC WATER INTAKES
STP SEWAGE TREATMENT PLANT OUTFALLS
COMBINED SEWER OVERFLOWS
SEWAGE TREATMENT PLANT LOCATIONS
ECORSE
Ecorse River
Mud Island
WAYNE CO. WATER INTAKE
Grassy Island
FIGHTING ISLAND
Grass Island
WYANDOTTE WATER INTAKE
WYANDOTTE
Pt. Mamajuda
INTERNATIONAL BOUNDARY CAN US
Wyandotte Sewage Treatment Plant
WYANDOTTE STP OUTFALL (WAYNE CO.)
RIVERVIEW
Riverview Sewage Treatment Plant
Monguagon Creek
Turkey Island
Grosse Ile Sewage Treatment Plant
GROSSE ILE STP OUTFALL (POTAWATOMI WOODS) (WAYNE CO.)
TRENTON
(NEW) TRENTON STP OUTFALL
(Old) Trenton Sewage Treatment Plant
Trenton Sewage Treatment Plant (New)
(OLD)
GROSSE ILE
Stony Island

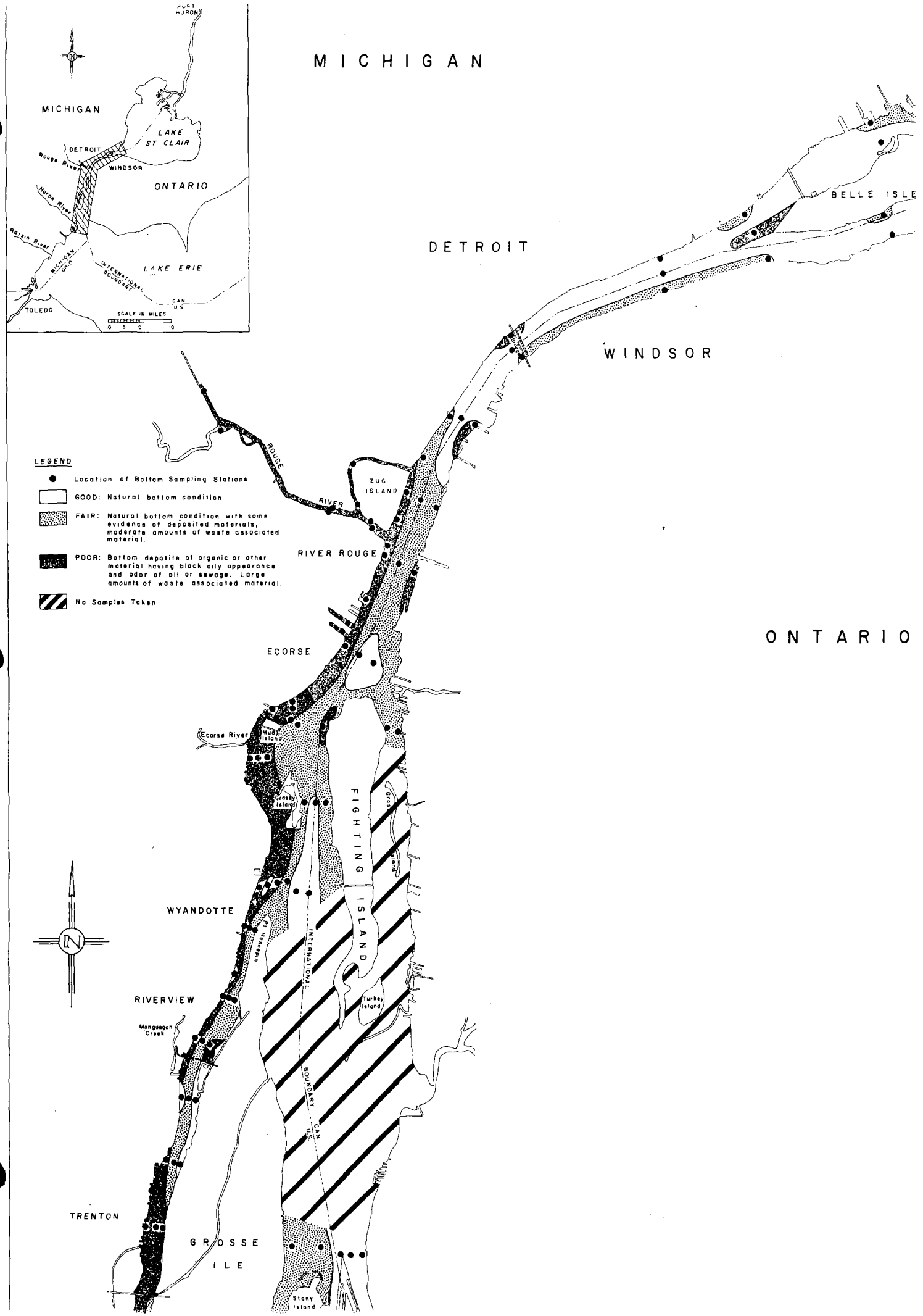

MICHIGAN
DETROIT
WINDSOR
BELLE ISLE
ONTARIO
ROUGE RIVER
ZUG ISLAND
RIVER ROUGE
ECORSE
Ecorse River
Mud Island
Grassy Island
FIGHTING ISLAND
Grassy Island
WYANDOTTE
Pt. Hennepin
INTERNATIONAL BOUNDARY CAN. - U.S.
Turkey Island
RIVERVIEW
Monguagon Creek
TRENTON
GROSSE ILE
Stony Island
LEGEND
Location of Bottom Sampling Stations
GOOD: Natural bottom condition
FAIR: Natural bottom condition with some evidence of deposited materials, moderate amounts of waste associated material.
POOR: Bottom deposits of organic or other material having black oily appearance and odor of oil or sewage. Large amounts of waste associated material.
No Samples Taken
PORT HURON
MICHIGAN
LAKE ST. CLAIR
DETROIT
Rouge River
WINDSOR
ONTARIO
Huron River
Raisin River
MICHIGAN
OHIO
INTERNATIONAL BOUNDARY
LAKE ERIE
CAN.
U.S.
TOLEDO
SCALE IN MILES
10 5 0 10

TABLE 21-V. SUMMARY OF BOTTOM MATERIALS - DETROIT RIVER

MILE 25 TO MILE 19.5

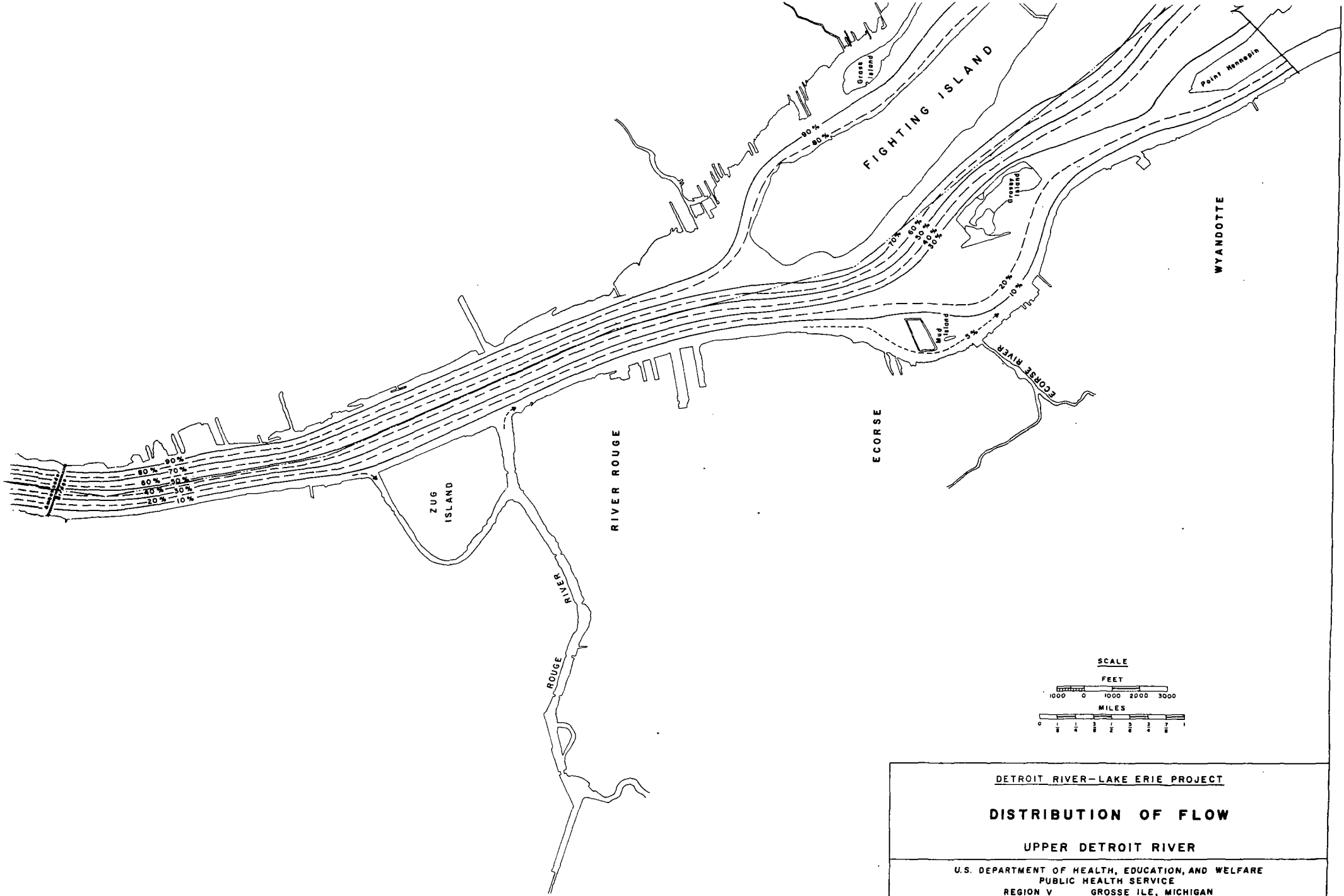
	No. of Samples	Max.	Min.	Med.	Mean	Remarks
pH						10.1 just downstream from Allied Chemical at Zug Island.
AM	10	10.1	7.4	7.7	8.0	
CAN	4	7.8	7.4	7.6	7.6	
% IRON						Low values except for one 11% value at Zug Island.
AM	7	11.01	0.01	0.56	2.35	
CAN	4	4.13	0.02	0.28	1.17	
% OIL AND GREASE						Low to medium values.
AM	10	0.60	0.00	0.14	0.17	
CAN	4	0.50	0.02	0.18	0.22	
% TOTAL VOLATILE SOLIDS						Both high and low values found on both sides of river.
AM	8	17.0	8.2	8.2	10.2	
CAN	4	20.2	8.4	10.3	12.8	

CONCLUSION: Bottom conditions generally good except for the Zug Island area particularly below Allied Chemical outfall.

TABLE 22-V. SUMMARY OF BOTTOM MATERIALS - ROUGE RIVER

	No. of Samples	Max.	Min.	Med.	Mean	Remarks
pH	6	7.3	6.8	7.0	7.0	
% IRON	4	8.60	1.72	2.74	3.95	Fairly high
% OIL AND GREASE	6	4.20	1.00	1.75	2.18	Very high
% TOTAL VOLATILE SOLIDS	6	25.6	11.1	20.9	19.9	Very high

CONCLUSION: Bottom condition in the Rouge River is very poor.



DETROIT RIVER–LAKE ERIE PROJECT

DISTRIBUTION OF FLOW

UPPER DETROIT RIVER

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
REGION V GROSSE ILE, MICHIGAN

Tables 11-V through 13-V list the industries by name and location which discharge wastes directly to the study waters of the Detroit River and Rouge River. The tables include information on production (where available), waste water volume, significant waste constituents, and treatment and control employed for the process wastes. The tables do not include data on sewage from plant employees, as in all but a few minor cases the sewage is discharged to municipal sewers and is considered in the discussion of domestic wastes. Industries which discharge process wastes to municipal sewerage systems are also not included, since satisfactory disposal of these wastes is the responsibility of the municipality involved and is considered in the section on domestic wastes. The total quantity of waste water released by the Detroit and Rouge River industries in 1.1 billion gallons per day. Undoubtedly, significant additional waste discharges are caused by accidental spills of industrial wastes not reflected in effluent measurements.

Tables 11-V, 12-V, and 13-V follow.)

TABLE 11-V. SOURCES OF INDUSTRIAL WASTES - ROUGE RIVER

TABLE 11-V. SOURCES OF INDUSTRIAL WASTES - ROUGE RIVER

Industry	Volume (MGD)	Product	Production	Significant Waste Constituents	Waste Treatment or Control
Allied Chemical Corporation					
General Chemicals Division	9.11	sulfuric acid, aluminum sulphate.	-	acid	ponds, pH monitors.
Plastic Division	0.48	coal tar, pitch, oil.	-	phenols, NH_3	dephenolizers, settling, oil separators.
Semet-Solvay Division	5.9	high-grade coke and by-products	-	phenols	dephenolizer, oil separator
Solvay Process Division	15.2	soda ash	1,000 ton/day	suspended solids, chlorides, phenols	lagoons
American Agricultural Chemical Company	1.15	fertilizer, gelatin, fluoride salts	-	acid	none
Darling and Company	1.13	fats and meat meal	-	BOD, coliform, N, suspended solids, oil	sedimentation
Ford Motor Company	400	steel, castings, coke, glass, automobiles	-	phenols, CN, NH_3, iron, oil	oil separator, sedimentation, sub-surface injection.
Peerless Cement Company	8.1	Portland cement	3 [illegible] million barrels/year	suspended solids	none
Scott Paper Company	43.8	high-grade paper tissue	240 tons/day	BOD, pH, Susp. solids, phenols.	screening, clarifiers
TOTAL	433.72				

TABLE 12-V. SOURCES OF INDUSTRIAL WASTES - UPPER DETROIT RIVER

Industry	Volume (MGD)	Product	Production	Significant Waste Constituents	Waste Treatment or Control
Allied Chemical Corporation					
Solvay Process Division	6.4	soda ash	1,000 tons/day	suspended solids, chlorides, phenols	lagoons
Anaconda-American Brass Company	5.3	copper	-	toxic metals, acid	neutralization, settling
Great Lakes Steel Corporation					
Blast Furnace Division	90	coke, pig iron, coke by-products	-	iron, susp. sol., phenols, oil, NH_3, cyanides	clarifiers, dephenolizer
Parke Davis and Company	8.1	pharmaceuticals	-	none	none
Revere Copper and Brass Company	2.9	brass and copper	-	oil, toxic metal	oil separators
U.S. Rubber Company	42	tires	-	none	oil skimmers
	TOTAL 154.7				

TABLE 13-V. SOURCES OF INDUSTRIAL WASTES - LOWER DETROIT RIVER

Industry	Volume (MGD)	Product	Production	Significant Waste Constituents	Waste Treatment or Control
Chrsyler Corporation					
Amplex Division	0.32	gears	-	none	none
Chemical Products Division	0.27	chemical adhesives, brake linings, soluble oils	-	none	none
Engine Plant	1.1	engines	55,000/mo.	oil	air flotation and oil skimmer, chemical coagulation
Dana Corporation	0.38	auto and truck frames, trilevel RR car carriers	-	phenols, acid, oil, iron	none
E.I. duPont deNemours and Company	1.4	sulfuric acid, oleum	-	acid	none
Firestone Tire and Rubber Company	1.0	wheel rims	11,400,000 lbs./mo.	acid, iron, oil, suspended solids	oil separator, ponds, diffuser pipes
Fuel Oil Corporation	12,240*	ship washing	18 ships/yr.	oil, suspended solids	oil separator
Great Lakes Steel Corporation					
Hot Strip Mill	72	sheet steel	-	oil, iron, suspended solids	oil skimmers and settling basins
Rolling Mill	72	strip, sheet and bar steel	-	oil, phenols, acid, iron, suspended solids	oil separators

* gallons per hour when washing ship.

TABLE 13-V – Continued

Industry	Volume (MGD)	Product	Production	Significant Waste Constituents	Waste Treatment or Control
Koppers Company, Incorporated	0.8	naphthaline, paraffin epoxy resins	-	phenols, oil	none
McLouth Steel Corporation					
Girbraltar Plant	1.6	cold rolled steel	80,000 tons/mo.	acid, iron, suspended solids, oil	oil skimmers, lagoons
Trenton Plant	65.7	stainless steel	2,530,000 tons/yr.	iron, suspended solids, oil	chemical coagulation, settling neutralization, oil separators
Mobil Oil Corporation	1.1	gasoline, naptha, kerosine, oils	-	phenols, oil, chlorides, suspended solids	oil separator, ponds
Monsanto Chemical Company	18	phosphates and detergent	-	phosphates, suspended solids	lagoons
Pennsalt Chemicals Corporation					
East Plant	97	chlorine, caustic, NH_3, hydrogen peroxide, acid, ferric chloride	-	NH_3, chlorine, chlorides, suspended solids	none
West Plant	6.8	organic chemicals	-	phenols, chlorides, suspended solids, oil, oxidizing agents	lagoons, oil skimmers
Shawinigan Resins Corporation and Monsanto Saflex Division	0.4	polyvinyl butyral Ethyl acetate	500,000 lbs/week	acid, BOD, suspended solids	lagoons, neutralization

TABLE 13-V – Continued

Industry	Volume (MGD)	Product	Production	Significant Waste Constituents	Waste Treatment or Control
Wyandotte Chemicals Corporation					
North Plant	57	soda ash, bicarb of soda, lime, calcium carbonate, cellulose	-	phenols, chlorides, suspended solids, nitrogen	lagoons
South Plant	54.7	chlorine, lime, glycol, cement, soda, dry ice	-	chlorides, suspended solids, phenols	lagoons, oil separator
Propylene Oxide Plant	1.0	propylene oxide	65 tons/day	chlorides, suspended solids	lagoons
TOTAL	452.57				

Rouge River Industries

Nine plants on the Rouge River use this watercourse as the receiving stream for their wastes. Their principal products are steel, fabricated metals, heavy chemicals, pulp and paper, cement, and meat-rendering products. (See Table 11-V.) These plants produce a total waste volume of 484 million gallons per day. 83% of this volume originates from the Ford Motor Company. Principal wastes are iron, oxygen-demanding materials, bacteria, suspended solids, oil, pickling liquor, phenols, chlorides, cyanides, toxic metals, and ammonia. With the exception of the American Agricultural Chemical Company and Peerless Cement, the industries provide some form of treatment to restrict discharge of wastes to the Rouge River.

Upper Detroit River Industries

Six industries (shown in Table 12-V) discharge wastes directly to the Detroit River above the Rouge River outlet. The Allied Chemical Corporation, Solvay Process Division, discharges a portion of its wastes through the Schroeder Avenue storm sewer and one outfall located on Zug Island immediately below the outfalls of the Great Lakes Steel Corporation, Blast Furnace Division. These six plants manufacture copper and brass products, pharmaceuticals, rubber tires, soda ash, coke, and iron.

Significant waste constituents originating from these industries consist of chlorides, iron, suspended solids, phenols, ammonia, and oil. All, with the exception of Parke Davis, provide some form of treatment.

Lower Detroit River Industries

Twenty-one industries (shown in Table 13-V) release wastes directly to the Detroit River below the Rouge River. Four are large steel manufacturing complexes, four produce automobile machinery, nine manufacture synthetic organic and heavy chemicals, others make industrial adhesives and petroleum products, and one is engaged in the vessel-washing business. Waste constituents include acids, oxidizing agents, suspended solids, phosphates, oil, ammonia, phenols, oxygen-demanding materials, iron, and chlorides. Common waste treatment methods are oil separation, oxidation for phenol control, and ponding for sedimentation and controlled waste discharge. Industries that do not provide any means of treatment are Chrysler Corporation (Amplex and Chemical Products Divisions), Dana Corporation, duPont, Koppers Company, and the Pennsalt Chemical Corporation East Plant.

In the Detroit area the principal waste constituents discharged directly to adjacent waters are suspended solids, BOD, oil, phenols, acid, ammonia, chlorides,

iron, and toxic ions in plating and metal finishing wastes such as cyanide, chromium, copper, cadmium, nickel, zinc, and lead.

Size of Loadings

Table 14-V summarizes waste loading by area of contribution for several waste constituents. Waste loadings represent amounts added by each industry in excess of those in the raw water supply used by the industry.

Table 15-V shows those concentrations of waste materials released to the Rouge River which either exceed the IJC recommendations for control of boundary water. quality or exceed reasonable limits for effective waste control. In the case of suspended solids, the judgment was based on the fact that effective sedimentation of wastes should remove essentially all of the readily settleable material and reduce the remaining suspended solids to a level not to exceed 35 mg/l.

(Tables 14-V and 15-V follow)

TABLE 14-V. INDUSTRIAL WASTE LOADINGS BY AREA - DETROIT RIVER

Area	BOD (lbs)	BOD (PE)	OIL (gallons)	IRON (lbs)	Susp. Solids (lbs)
Rouge River	145,000	871,000	933	19,000	108,000
Upper Detroit River	5,260	31,400	735	5,150	222,000
Lower Detroit River	19,700	118,000	1,680	58,200	534,000
Total	169,960	1,020,400	3,348	82,350	864,000

Area	Cyanides (lbs)	Phenol (lbs)	Chlorides (lbs)	Ammonia (lbs)	Toxic Metals (lbs)	Acid (lbs)
Rouge River	900	810	307,000	5,280	2,040	50,000
Upper Detroit River	10	373	470,000	2,910	1,950	0
Lower Detroit River	119	225	1,940,000	336	1,200	185,900
Total	1,029	1,408	2,717,000	8,526	5,190	235,900

TABLE 15-V. INDUSTRIAL EFFLUENTS CONTAINING HIGH CONCENTRATIONS OF WASTE MATERIALS AND VALUES OF PHENOLS, pH, OIL, AND IRON EXCEEDING IJC EFFLUENT RECOMMENDATIONS

Rouge River	Phenols (µg/l)	pH	Oil (mg/l)	Chlorides (mg/l)	Susp.Sol. (mg/l)	Sett.Sol. (mg/l)	Iron (mg/l)	BOD (mg/l)
Allied Chem. Corp.								
Solvay Process Div.								
Waste Pond No. 3	750	11.1		100,000	234	44		
" " No. 2	415	11.0		115,000	216			
Sewer No. 1	45							
" No. 3	55				166			
Plastics Div.	8,750							950
Darling & Co.			50		110			830
Scott Paper Co.	73				97			372
Peerless Cement					331	272		
Ford Motor Co.								
Gate 11			23			51		
Tailrace	375							
Roulo Creek		4.6			171	133	28	
Foundry	2,248				102	87		

The principal wastes from the Allied Chemical Corporation plants are chlorides, phenols, and suspended solids from the two Solvay Process plants which typify wastes produced in making soda ash. These plants produce their own coke for firing the ovens which accounts for the phenolic compounds. The Plastic Division plant produces phenolic waste from the distillation of crude tar in making carbolic oils and pitch. Darling and Company, a meat-rendering plant, produces wastes similar to those from a slaughterhouse with ineffective control measures. The effluent is high in organic content - 7,000 pounds per day BOD.

The Ford Motor Company Rouge Plant is one of the largest of its kind in the world and has in the past been able to manufacture an automobile from the basic raw materials of iron ore, sand, and crude rubber. Their waste products exhibit the vastness of the operation. Ford Motor Company, by far the largest water user in the Rouge River, releases large quantities of wastes, as seen in Table 10-V. The following listing gives the percent of industrial waste constituents discharged to the Rouge River which originates from the Ford Motor Company:

TABLE 16-V. INDUSTRIAL EFFLUENTS CONTAINING HIGH CONCENTRATIONS OF WASTE MATERIALS AND VALUES OF PHENOLS, pH, OIL AND IRON EXCEEDING IJC EFFLUENT RECOMMENDATIONS

Upper Detroit River	Phenols (µg/l)	pH	Oil (mg/l)	Chlorides (mg/l)	Susp.Sol. (mg/l)	Sett.Sol. (mg/l)	Iron (mg/l)	BOD (mg/l)
Revere Copper and Brass Co.								
Outfall No. 1			146		115	81		
Outfall No. 2						44		
Allied Chem. Corp.								
Solvay Process Div. Cone Effluent	445	11.0		185,000	11,500	11,500		
Great Lakes Steel								
Blast Furnace Div.								
Outfall No. 2	1,150				95	95	20	
" No. 3					172	172	35	
" No. 4	68		37		185	180	16	
" No. 4A	410					82		
" No. 5					144	143	49	
" No. 6	1,250					42		
" No. 7					176	174		
" No. 8	176				240	220		
Parke-Davis								
Outfall No. 1						15		
" No. 2						15		
" No. 3						27		

Table 16-V summarizes effluent waste concentrations in the upper Detroit River considered high. Average concentrations and loadings for this area are found in Tables 9-V or 10-V.

The Great Lakes Steel Corporation, Blast Furnace Division, releases a large percentage of the waste materials that enter the upper Detroit River, as shown by the following listing:

Industrial Waste Constituent	% from Great Lakes Steel
Iron	99
Oil	50
Phenols	99
Suspended Solids	45
Toxic Metals	51
Ammonia	100

Almost all of the eight outfalls contained phenols above the recommended limit of 0.020 mg/l, and suspended solids were concentrated enough to discolor the River in a trail close to the shoreline. The suspended solids were primarily made up of readily settleable material. Approximately 1,000 pounds per day of toxic metals are lost to the Detroit River with 700 pounds of this being zinc.

The Allied Chemical-Solvay Process outfall,

located below the Blast Furnace complex, discharged 54% of the suspended solids and 96% of the chlorides to this reach of the River. This one outfall, although small in flow, contained the largest concentration of wastes observed during the study even though the flow passed through a sedimentation pond.

The Revere Copper and Brass Company waste effluent discharged 360 gallons of oil per day, which represents over half the amount of oil released in the upper River.

The waste effluents from Parke Davis, Anaconda-American Brass Company, and U. S. Rubber Company have only limited effect on water quality. However, the U.S. Rubber Company discharges 650 pounds per day of zinc to the Detroit River.

Table 17-V lists those industries in the lower Detroit River whose effluent discharge is considered to contain certain waste constituents in high concentrations.

(Table 17-V follows, constituting 3 pages)

TABLE 9-V. SUMMARY OF RANGES OF AVERAGE RESULTS OF INDUSTRIAL WASTE EFFLUENT CONCENTRATIONS - DETROIT RIVER

Industry	Flow MGD	BOD mg/l	COD mg/l	Susp. Sol. mg/l	Sett. Sol. mg/l	Chlorides mg/l	Oil mg/l	Phenols µg/l	Iron mg/l	pH	NH_3-N mg/l	Phosphate mg/l	ABS µg/l	Alkalinity mg/l	Acid mg/l	Cyanides mg/l	Copper mg/l	Cadmium mg/l	Nickel mg/l	Zinc mg/l	Lead mg/l	Chromium mg/l
ROUGE RIVER																						
Allied Chemical Corp																						
General	9.11	-	33-146	22-79	30	46-95	2	5-62	15.8	5.8-7.7	-	-	20-50	25-89	8-1,050	0	0.31	0.08-0.17	.01-.02	.02-.63	.03-.09	.01-.02
Plastics	0.48	1.4-950	32-1390	8-62	61	8-55	4	900-10600	.12-.67	6.6-9.5	166	-	50-190	34-715	-	0-2	0.15	.01-.06	<.01-.01	.01-.11	.02-.04	.01-.07
Semet Solvay Div.	5.9	2-4	21-31	28-33	-	11-16	-	8-152	1	7.7-8.3	-	-	30	82-92	-	.01-.04	.03-.09	<.01	<.01-.01	.06	.03-.06	.01
Solvay Process Div.	15.2	6	28-11718	56-257	0-80	34-130000	6-29	7-1090	-	8.2-11.1	-	-	0-250	187-1380	-	0-.08	.04-.13	<.01-.03	<.01-.03	<.01-.22	.02-.27	<.01-.14
Am. Agri. Chem. Co.		1-3	5-22	8-60	-	24-66	-	4-64	-	3.0-7.5	-	-	50-220	48-67	117-1539	0	.08-3.05	<.01	<.01-.02	.16-.39	.06-.27	<.01-.01
Darling & Company	1.13	830	-	72-147	80	14-15	20-40	31-34	.98-2.16	7.4	13.3-15	.77-1.15	270-330	134-136	-	-	-	-	-	.11-.14	.09-.13	<.01
Ford Motor Co.	400	3-6	62	0-171	0-133	9-75	2-30	0-375	.08-64	4.6-8.0	.11-4.3	-	20-170	32-100	123-176	0-.74	.02-2.2	<.01	<.01-.15	.02-.12	<01-.14	<.01-.74
American Cement Corp. Peerless Cem. Div.	8.1	1-7	34-77	14-549	1-421	9-55	4-7	2-100	.5-11.7	7.1-8.8	.1-1.18	-	40-210	70-87	-	0	<.01-.02	<.01	<.01-.01	<.01-.04	.06-.90	<.01-.04
Scott Paper Co.	43.8	1080-1350	235-530	74-132	-	93-111	-	63-83	-	5.4-6	-	-	230-350	29-33	-	0	.26-.37	<.01	<.01	.02-.75	.03-.06	<.01-.19
UPPER DETROIT RIVER																						
Allied Chemical Corp Solvay Process Div.	6.4	-	11-12070	20-1600013	-14000	14-160000	10-12	6-460	-	9.0-11	-	-	40	137-8563	-	-	.07-.08	<.01	.01-.02	<01-.07	.03-.21	<.01-.26
Anaconda-American Brass Co.	5.3	4-58	261	26	-	3-7	5-6	5-6	0.6	7.0-7.1	-	-	10	45-58	-	-	6.3-9.15	<.01	<.01	1.2-7.05	<01-.08	.93-1.5
Great Lakes Steel Blast Furnace Div.	90	3-14	0-27	9-240	8-220	11-326	6-41	3-2500	1.4-35	6.7-9.2	.15-5.1	-	50-270	63-176	-	0-1.14	.03-.07	<01-.05	<.01-.09	.06-2.38	.12-1.59	<.01
Parke Davis Company	8.1	1-10	-	4-34	0-27	8-21	2-57	0-380	.35-1.07	7.1-8.6	.08-0.5	-	30-100	81-94	-	0-.06	<.01-.09	<.01-.03	.01-.03	<.01-.05	.02-.03	<.01-.01
Revere Copper and Brass Co.	2.9	6-31	-	10-132	7-132	1-12	14-209	0-9	.18-.72	6.8-8.2	0-.06	-	70-120	41-91	-	0-.01	.04-6.1	<01-0.1	<.01-.32	.34-4.1	.04-.35	<.01-2.3
U.S. Rubber Co.	42	3-9	-	0-32	0-22	8-36	5-15	0-14	.65-1.32	7.2-8.2	.06-0.2	.02-.20	50-100	75-95	-	0	.01-.04	<.01	<.01	.05-5.9	<01-.05	<.01
LOWER DETROIT RIVER																						
Chrysler																						

TABLE 9-V. (CONT.) SUMMARY OF RANGES OF AVERAGE RESULT
INDUSTRIAL WASTE EFFLUENT CONCENTRATIONS - DETROIT RIV

Industry	Flow MGD	BOD mg/l	COD mg/l	Susp. Sol. mg/l	Sett. Sol. mg/l	Chlorides mg/l	Oil mg/l	Phenols µg/l	Iron mg/l	pH	NH_3-N mg/l	Phosphate mg/l	ABS µg/l	Alkalinity mg/l	Acid mg/l	Cyanides mg/l	Copper mg/l	Cadmium mg/l	Nickel mg/l	Zinc mg/l	Lead mg/l	Chromium mg/l
Firestone Tire & Rubber Co.	1.0	7-21	51-455	20-365	12-301	65-125	9-13	19-43	.02-470	2.1-8.6	-	-	100-1100	80-132	220-557	-	.10-1.25	<.01	<.01-.01	.07-.86	<.01-.06	<.01-.80
Fuel Oil Corp.	12240*	590	8150	182	0	55	347	130	-	8.3	-	-	1080	147	-	-	.06	<.01	<.01	.06	.09	<.01
Great Lakes Steel																						
Ecorse	72	-	10-254	14-119	0-84	23-44	0-165	0-140	.51-2240	1.7-8.5	.12-.29	-	30-250	7-115	21-8540	0-.01	.04-1.48	<.01	.01-.04	.04-.32	.02-.68	.01-.14
Strip Mill	72	2-6	58-84	15-119	3-107	31-38	6-14	2-14	1.2-8.1	7.4-7.8	.09-.57	-	50-150	76-83	-	0-.01	<.01-.04	<.01-.02	.01-.02	.05-.20	.09-1.6	<.01
Koppers Company	0.8	25-80	239-315	2-41	0-41	100-261	0-18	5-1360	1.3-30.5	4.8-7.6	0.1-0.5	-	90-200	26-76	-	.01-.1	.04-2.75	<.01	<.01-8	.09-1.36	.05-.96	<.01-.04
McLouth Steel Corp.																						
Trenton Plant	65.7	0-290	-	4-1024	26-800	5-425	0-39	0-119	3-64	4.6-10.1	-	-	150-670	80-222	-	0-1.12	<.01-.66	<.01-.01	<.01-.21	.01-3	<.01-.74	<.01-.11
Gibraltar Plant	1.6	6	9-15	17-32	-	85-1835	18	1-80	.02-15	3.6-7.7	-	-	152-167	85-88	1100	-	.02-.04	<.01	.01	.04-.42	.01-.02	<.01
Mobil Oil Company	1.1	120	216-530	112-257	65	980-15000	69-82	8000-17300	.14-.49	7.4-9.0	-	-	2000-2400	6-179	1900	0	<.01-.14	<.01-.01	<.01-.02	<.01-.18	.08-.64	<.01-.18
Monsanto Chem. Co.	18	-	46-137	18-143	12	72-80	-	9.6-27	.3-.45	7.2-7.3	-	110-240	240-298	108	-	.01	.04-.08	<.01	.01-.03	.04	<.01	<.01
Pennsalt Chem. Corp.																						
East Plant	97	3-17	6-172	19-757	24-124	122-20000	5-8	0-22	0	7.5-11.2	.44-16.9	-	0-1100	83-356	-	-	<.01	<.01-.01	<.01-.05	<.01-.08	<.01-.17	<.01-.03
West Plant	6.8	-	80-256	57-162	5-129	212-720	5.1-7	510-1260	.02-.05	7.3-10.4	-	-	120-170	71-189	-	-	<.01	<.01-.02	<.01-.01	<.01-.03	<.01-.02	<.01-.05
Shawinigan Resins & Monsanto Saflex	0.4	1900	606-3619	32-720	-	16-44	6	5.3-11	.15	7.1-10.6		-	130-555	205-996	1940	-	<.01-.05	<.01	.02-.08	.01-.29	<.01-.05	<.01
Wyandotte Chem. Corp.																						
North Plant	57	4-67	80-715	26-706	2-606	32-4910	8-10	0-800	.92-1.33	6.3-11.4	.11-2.3	.04-1.3	20-360	38-560		-	.02-.96	<.01-.24	<.01-.01	<.01-.02	<.01-.36	<.01-.13	<.01-.07
South Plant	54.7	4-80	0-1800	34-590	39-225	65-3194	5-15	0-27	3	7.4-9.6	0-1.4	.08-3	0360-6000	92-1055								

TABLE 10-V. (CONT.) SUMMARY OF AVERAGE DAILY LOADING OF INDUSTRIAL WASTES ADDED BY EACH INDUSTRY TO DETROIT RIVER

INDUSTRY	BOD lbs.	BOD P.E.	Susp. Sol. lbs.	Sett. Sol. lbs.	Chloride lbs.	Oil gal.	Phenols lbs.	Iron lbs.	NH_3-N lbs.	Cya-nides lbs.	Acid lbs.	Copper lbs.	Cadmium lbs.	Nickel lbs.	Zinc lbs.	Lead lbs.	Chro-mium lbs.	Phos-phates lbs.
E.I. duPont de Nemours & Company	0	0	0	0	1,500	0	0	23	-	0	-	0.3	0	0	6	0.4	0	-
Firestone Tire & Rubber Company	70	420	296	243	16	0	0.19	5,407	-	-	2,700	13	0	0	9	0	0	-
Fuel Oil Corp.	(1) 221	(1) 1,320	(1) 70	-	(1) 20	17(2)	0	0	-	-	0	-	-	-	-	-	-	-
Great Lakes Steel																		
Strip Mill	350	2,100	29,000	24,400	1,000	375	1.65	1,500	86	0	0	0	0	0	42	280	0	-
Ecorse	-	-	8,400	6,800	1,800	1,080	1.67	49,000	-	-	158,000	137	0	4	12	34	8	-
Koppers Company	112	670	25	24	158	2.4	0.6	13	-	0	0	2.7	0	0	2.8	1.2	0	-
McLouth Steel Corp.																		
Gibraltar Plant	0	0	-	-	25,600	33	0	210	-	-	15,400	-	-	-	-	-	-	-
Trenton Plant	5,000	30,000	15,588	9,200	24,267	37	9.04	1,990	250	119	0	63	0	9	300	325	3	-
Mobile Oil Company	1,000	6,000	1,588	-	12,989	98.5	117	2	-	-	0	0.7	0	0	0.5	3	0.8	-
Monsanto Chem. Corp.	-	-	6,500	-	0	-	0	6	-	-	-	3.5	0	0.8	0.4	0	0	10,000
Pennsalt Chem. Corp.																		
East Plant	-	-	93,370	70,000	500,000	-	0	0	-	-	0	0	0	0	0	0	0	-
West Plant	-	-	6,500	5,200	8,779	41.5	60	0	-	-	0	0	0	0	0	0	0	-
Shawinigan Resins	6,970	42,000	1,313	-	0	-	0.01	0	-	-	7,190	0	0	0	0	0	0	-
Monsanto Chem. Corp. Saflex Div.	79	423	34	-	0	-	0	-	-	-	0	0	0	0	0	0	0	-
Wyandotte Chem. Corp.																		
North Plant	2,200	13,200	300,000	255,000	1,300,000	-	34.13	-	-	-	0	59	0	0	7	0	0	14
South Plant	3,000	18,000	69,745	35,000	63,970	-	0	-	-	-	0	35	0	1	10	7	6	14

TABLE 10-V. SUMMARY OF AVERAGE DAILY LOADING OF INDUSTRIAL WASTES ADDED BY EACH INDUSTRY TO DETROIT RIVER

INDUSTRY	BOD lbs.	BOD P.E.	Susp. Sol. lbs.	Sett. Sol. lbs.	Chlorides lbs.	Oil gal.	Phenols lbs.	Iron lbs.	NH_3-N lbs.	Cyanides lbs.	Acid lbs.	Copper lbs.	Cadmium lbs.	Nickel lbs.	Zinc lbs.	Lead lbs.	Chromium lbs.	Phosphates lbs.
ROUGE RIVER																		
Allied Chemical Corp.																		
General Chemical Div.	-	-	1,135	680	456	-	0.1	-	-	-	0	5	4.1	0	11	1	0	-
Plastics Div.	60	360	0	0	12	1.3	9	0	140	0.6	0	0	0	0	0	0	0	-
Semet-Solvay Div.	50	300	100	-	150	-	7.3	0	-	0.35	0	2	0	0	0	0	0	-
Solvay Process Div.	0	0	10,000	-	240,000	0	17.6	-	-	0	0	3.6	0	0	2.8	1.5	0.4	-
American Agri. Chem.Corp	0	0	19	-	0	0	0.03	-	-	0	0	6.5	0	0	2.0	0.9	-	-
Darling and Company	7,100	42,500	168	90	14	21.6	0.29	-	135	-	0	0	0	0	0	1.0	0	5.5
Ford Motor Company	2,930	17,500	62,000	50,000	32,000	900	750	19,000	5,000	900	50,000	1,500	0	36	275	50	260	-
American Cement Corp.																		
Peerless Cement Div.	25	150	3,000	2,500	367	10	0.27	6	0	0	0	0	0	0	0	0	0	-
Scott Paper Company	135,000	810,000	31,300	-	33,600	-	26	-	-	0	0	114	0	0	230	0	0	-
Sub-Total	145,165	870,810	107,722	53,270	306,587	932.9	810	19,006	5,270	900.95	50,000	1,631	4.1	36	520.8	54.4	260.4	5.5
UPPER DETROIT RIVER																		
Allied Chemical Corp.																		
Solvay Process Div.	0	0	120,000	120,000	450,000	0	1.7	0	-	-	0	0	0	0	0	0	0	-
Anaconda-American Brass Company	376	2,250	135	-	0	0	0	1.1	-	0	0	60	0	0	32	0.25	10	-
Great Lakes Steel Corp.																		
Blast Furnace Div.	3,700	22,000	100,000	95,000	17,959	340	370	5,146	2,900	10	0	108	0	0	750	123	0	-
Parke Davis Company	17	100	65	0	45	35	1	0	-	0.13	0	0	0	0	0	0	0	-
Revere Copper & Brass Inc.	570	3,400	2,166	1,500	0	360	0	3.5	-	-	0	100	0	0.4	66	0.9	29	-